

SELF – CUSHION AIRFLOW SHOES

BY

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BACKGROUND OF THE INVENTION

1. FIELD OF THE INVENTION

This invention relates to self-cushion airflow shoes for ventilating the toe region and mid region of the human foot contained therein during use. Shoes have been worn outdoors by individuals since ancient times to protect their feet during walking, running or other physical activities, which require the use of feet.

One of the problems associated with shoes or footwear, especially in hot climate areas or periods of time, is the inability to dissipate or discharge heat and moisture from the shoe. Excessive heat and perspiration in shoes and footwear often cause comfort problems such as undesirable odor, blisters and fungal growth on the foot, especially around the toe and heel regions. In an attempt to alleviate this problem in shoes and footwear, users have worn specialized socks that wick moisture away from the foot, used deodorizing and disinfecting foot and shoe sprays and shoe insoles containing a deodorizer. These solutions, however, prove to be temporary and do not address the underlining cause of the above – described problems.

2. DESCRIPTION OF THE PRIOR ART

According to a report issued by the American Podiatry Association, approximately 75 percent of males and females stand, walk or run about 4 – 5 hours per day. This foot stress leads to foot problems such as undesirable odors in the shoe or footwear, blisters and athlete's foot fungi, especially in physically active individuals.

Several attempts have been made in the past to solve these common problems associated with shoes or footwear. For example, U.S. Patent 4,860,463 issued to Huang Pin for "Footwear Having Ventilation and Shock – Absorbing Properties", describes footwear including a sole which has a rear socket formed in the heel portion of the sole, a plurality of ventilation channels formed in the front toe portion thereof and an elastic pad inserted into the rear socket.

When an individual walks, the elastic pad is depressed and hot air is sucked from the shoe and discharged through outlet ports formed through the sole.

U.S. Patent 5,606,806 issued to O'Dwyer for "Self – Ventilating Footwear", teaches ventilated footwear including a sole, a pumping chamber formed in a heel portion of the sole, top, bottom and side walls which are resilient to bias the pumping chamber and provide support therefore. When an individual walks, a pumping action is created in the pumping chamber, which supplies air through an air inlet passage and is exhausted from the pumping chamber via an outlet passage.

U.S. Patent 6,041,519, issued to Cheng for Air – Circulating, Shock – Absorbing Shoe Structures relates to a structure for ventilating the toe region of a shoe. The structure contains a body having a toe

zone, a heel zone and an arch zone between said toe zone and heel zone and respective lateral zones bounding an enclosed pumping chamber. Conduit means are provided for establishing airflow paths between the toe region and one of said lateral zones. Pumping means is included for injecting air at an elevated pressure into air conduits to the toe region of the structure.

U.S. Patent 6,079,123 issued to Clark for "Self – Ventilating Insert For Footwear" describes a self-ventilating insert for footwear having a wedge – shaped pumping chamber located in the heel of the footwear. The pumping chamber has convex side and rear walls that fold together as the pumping chamber collapses. Maximum air circulation is achieved as the upper and lower surfaces of the pumping chamber come into full contact with each other.

An internal air duct is fluidly connected to the pumping chamber at one end and a plurality of parallel air channels at the other end. The plurality of air channels or tubes is described as capable of resisting kinking and pinching action near the flex zone of the footwear.

U.S. Patent 6,247,248 B1 issued to Clark entitled "Ventilation System And Method For Footwear", teaches a footwear ventilation system that introduces fresh air into a shoe using an air displacement chamber actuated by the downward force of a foot. The ventilation system comprises a lasting board and a ventilation unit comprising an inflow valve, an air displacement chamber located in the heel area, a set of non – pinching tubular channels connecting the inflow valve to the displacement chamber. Another outflow valve connected to the displacement chamber expels air to the atmosphere.

U.S. Patent 6,370,800 B1 issued to Hung entitled "Shoes With Air Pumps" describes a shoe containing an air pump which converts the dynamic force from the user into energy for the air pump wherein outer air can be taken in and transferred to the shoe surplus space. Next, the air is vented through gaps in the shoe surface so that air circulates between the interior and exterior of the shoe.

U.S. Patent 6,370,799 B1 issued to Thatcher, entitled "Ventilated Footwear Assembly", teaches a ventilated footwear assembly for providing air circulation through footwear during use. The ventilated footwear assembly includes a sole portion and an upper portion, a pumping chamber positioned in the sole portion, an inlet duct extending between the pumping chamber and an external of the footwear. The assembly contains an inlet valve and an outlet duct assembly extending from the pumping chamber to an interior surface of the footwear.

As can be seen from the foregoing, there is an ongoing research effort to develop new and novel devices for ventilating footwear.

SUMMARY OF THE INVENTION

The present invention comprises self-cushion airflow shoes which ventilate footwear containing the human foot. The self-cushion airflow shoes of the present invention contain a pumping chamber near the heel region. The pumping chamber has an elongated, half-circular configuration, which defines a hollow cavity. The bottom portion of the pumping cavity contains a plurality of shock absorbers, which have elongated circular configurations. The shock absorbers are constructed from a resilient rubber like material, which supplies cushion, bias, and a

spring like motion when they are stepped on and compressed by the human foot when in use.

The pumping chamber contains a first inlet check valve near the rear portion of said chamber. The first inlet check valve allows air to enter the pumping chamber from outside of the footwear, but prevents it from exiting back through said first check valve. The first check valve is connected to a first inlet air conduit which extends from said check valve up a back wall and to the top of said footwear.

The front portion of the pumping chamber contains a second outlet check valve, which allows air to pass out through said valve but prevents air from passing back through the valve. The second outlet check valve is connected to a second air conduit, which is centrally located and extends from the second check valve located in the front of the pumping chamber to the toe portion of the footwear.

A third air conduit having an elongated circular configuration is located near the mid section of the footwear and intersects the second air conduit at an angle of from 45 to 135 degrees, preferably from 45 to 120 degrees. The third air conduit contains a plurality of air outlet holes to allow air to pass there through and ventilate the footwear. A fourth air conduit intersects the second air conduit at a 90-degree angle near the toe portion of the footwear. The fourth air conduit is spaced apart from and parallel to the third air conduit. The fourth air conduit contains a plurality of holes to allow air to pass through them and ventilate the toe portion of the footwear.

The ventilation system of the present invention resides in the pumping chamber, shock absorbers, valves and air conduits, including opening, which are contained in a shoe or footwear. The top of the

ventilation system comprises a top sole that is constructed from a sponge like material with holes that match the holes located in the third and fourth air conduits. The top sole fits on top of second, third and fourth air conduits and extends from the heel portion of the shoe or footwear to the toe portion thereof. The first air conduit passes up through the heel portion of the top sole up to the highest section of the back wall of the shoe or footwear.

A bottom sole which is constructed from leather, rubber, or other conventional materials used to make shoes connects to the upper sole by conventional means such as bonding, sewing, heat sealing and the like. The bottom sole is connected to the upper portion of the bottom interior of the shoe.

It should be noted that the pumping chamber can be located at the mid sole region or the toe region of the footwear.

In an alternative mode of this invention a shoe insert is presented which fits inside a shoe or footwear. The insert is substantially as described above, with the exception that it is manufactured independently of the shoe or footwear and is designed to be inserted into a pre-constructed shoe or footwear.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is front cut-away perspective view of a shoe containing the self-cushioned air ventilating system of the present invention.

Fig. 2 is a front, exploded view of a shoe insert for a self-cushion airflow shoe or footwear as described herein.

DETAILED DESCRIPTION OF THE INVENTION

The present invention resides in a self-cushion airflow shoe which ventilates the human foot during use. The shoe contains a pumping chamber, two separate air check valves and air conducts to direct the air flow to out-let holes located in the interior of the shoe. The pumping chamber, in addition, contains a plurality of shock absorbers which cushion the heel portion as the heel presses down on the pumping chamber for example when walking. The shock absorbers act like miniature springs, pushing the heel in an upward motion when the walking motion releases pressure on the pumping chamber.

Embodiments of the self-cushion airflow shoes of the present invention are hereinafter described with reference to the drawings, in which identical or corresponding parts are indicated by the same reference characters or numbers through the several views.

Fig. 1 illustrates a cut-away perspective view of a self-cushion airflow shoe 2 containing the air ventilating system 5 of the present invention. Self-cushion airflow shoe 2 contains pumping chamber 4 near the heel region. Pumping chamber 5 has an elongated, half circular configuration, which defines hollow cavity 7. The bottom portion of pumping chamber 4 contains a plurality of shock absorbers 6A to 6D. The numbers of shock absorbers 6A to 6D, which are representative preferably, are from 6 to 20, especially from 10 – 15. Shock absorbers 6A – 6D have elongated circular configuration and are constructed from an impervious resilient rubber type material. Rubber type materials that are suitable for use here in include polypropylene, polyurethane, and ethylene vinyl acetate rubber.

It is to be noted that pumping chamber 5 can be located near the mid sole region or the toe region of the footwear.

A first air inflow check valve 8 is connected to the back portion of pumping chamber 4 at one end and to first inlet air conduit 10 at the other end. First inlet air conduit 10 has an elongated circular configuration and extends from first air inflow check valve 8 up the back side 11 of shoe 2 ending with air intake opening 12. First air inflow check valve 8 allows air to flow into pumping chamber 4, but prevents air from flowing out there from. It should be noted that all of the air conduits herein have elongated circular configurations and are hollow to promote the flow of air there through.

A second air outflow check valve 14 is located near the front region of pumping chamber 4 and connects to second air conduit 16 which is centrally located in shoe 2 and extends from the pumping chamber 4 region to the toe region 9 of shoe 2. Second air conduit 16 has an elongated, circular configuration. Second outflow check valve 14 allows air to flow from pumping chamber 4 but prevents it from back into said pumping chamber 4.

A third air conduit 18 intersects second air conduit 16 at an angle of from 45 to 135 degrees, preferably from 45 to 120 degrees near the mid section region 32 of shoe 2. Third air conduit 18 contains a plurality of air holes 20A and 20B, which are representative of said air holes. A desirable number of air holes 6A and 6B is from 2 to 8, preferable from 2 to 4 in third air conduit 18. It is to be noted that the size of air holes 6A and 6B can be adjusted to have a diameter of form 1MM to 4MM, preferably from 2MM to 3MM. This allows for

adjustment. Of airflow into the interior of the shoe to be adjusted according to the climate condition of the region.

A fourth air conduit 22 intersects second air conduit 16 at an angle of from 45 to 135 degrees, preferably from 45 to 120 degrees in the toe region 9 of shoe 2. Fourth air conduit 22 contains a plurality of air holes 23A to 23D which are representative of said holes. The number of air holes in air conduit 22 is from 4 to 12, preferably from 4 to 8. The size of air holes 23A to 23D can be adjusted to have a diameter of from 1MM – 4MM, preferably from 2MM to 3MM.

The top sole 24 of shoe 2 fits on top of air ventilation system 5 and is preferably constructed from a soft, modified rubber material that is sponge like for absorbing moisture. Top sole 24 has holes, which correspond to the holes located in air conduits 18 and 22.

In use, a user of shoe 2 places his foot inside said shoe and engages in a walking motion. As the heel is lowered onto the top of pumping chamber 4, said chamber 4 is compressed forcing air through second outlet check valve 14 and air conduits 16, 18 and 22. First inlet check valve 8 prevents air from passing out through first inlet air conduit 10. As pumping chamber 4 is compressed, the heel engages and applies bias to shock absorbers 6A to 6E, which cushions the impact of the heel on shoe 2. Shock absorbers 6A to 6D are compressed when the heel is lowered on them. When the heel is elevated bias is released from the top of pumping chamber 4 and said chamber expands to its original size and shape. This produces an air void and fresh air is sucked in through opening 12 of first air inlet conduit 10 through first inlet check valve 8 and into pumping chamber 4. It should be noted that when bias is released from the top of pumping chamber 4, depressed shock

absorbers 6A to 6D act as miniature springs as they return to their original shapes.

Fig. 2 is a front exploded view of a shoe insert 1 containing the air ventilating system 5 of the present invention. The elements of air ventilating system 5 of shoe insert 1 are substantially the same as those of the self-cushion air flow shoes of Fig. 1 with the following exceptions:

1. Shoe insert 1 is separate and not manufactured as a part of a shoe.
2. Shoe insert 1 is manufactured in different sizes to fit the various sizes of shoes into which they are to be inserted.

Shoe insert 1 contains air ventilating system 5 which has the same elements of the air ventilating system 5 of Fig. 1 except that air ventilating system 5 of Fig. 2 is contained in top sole 25 and bottom sole 26. The system is portable, that is, it can be transferred from one set of shoes to another set of shoes.

It is to be noted that the shoes and shoe inserts herein are constructed from modified rubber compounds substantially as described herein. Obviously, many modifications and variations of the invention as hereinbefore set forth, may be made without departing from the spirit of scope thereof, and therefore, only such limitations should be imposed as are indicated in the appended claims.